AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of the claims in the above-captioned patent application.

Listing of Claims:

1.   (Currently Amended) A solid state image pickup device comprising:

a semiconductor substrate having a first layer of a first conductivity type;

a second layer of a second conductivity type opposite to the first conductivity type, said second ~~conductivity type~~ layer being formed on the first ~~conductivity type~~ layer, ~~of~~ in said semiconductor substrate;

a first region of the first conductivity type formed in said second layer and constituting a photodiode with said second layer, the first region being electrically floating and capable of storing charge carriers;

a first gate structure including a charge storage region and a control gate, said first gate structure being formed on a surface of said semiconductor substrate adjacent to a portion of said first region, and said charge storage region being isolated from said first region;

a second region of the first conductivity type formed in said second layer adjacent to said first gate structure on a side opposite to said first region, and constituting a non-volatile memory element with said first region and said first gate structure;

a first wiring connected to said second region for applying a voltage to said second region;

a light shielding film formed above said first gate structure and having an

aperture above ~~an optical window formed on~~ said first region ~~and made of transparent material~~; and

a control circuit for applying a first write voltage to the control gate of said first gate structure, the first write voltage being a write voltage for tunneling and injecting charges accumulated in said first region into the charge storage region.

2. (Original) The solid state image pickup device according to claim 1, wherein said control circuit applies a second write voltage to the control gate of said first gate structure and to the second region after the first write voltage is applied, the second write voltage being a write voltage for injecting charges accumulated in said first region into the charge storage region as hot carrier injection.

3. (Original) The solid state image pickup device according to claim 1, further comprising;

a second gate structured of an insulated gate type formed adjacent to another portion of said first region; and

a third region of the first conductivity type formed adjacent to a side of said second gate structure opposite to said first region, said third region constituting an insulated gate type transistor with said first region and said second gate structure.

4. (Currently Amended) The solid state image pickup device according to claim 1, further comprising a ~~third~~ <u>fourth</u> region of the first conductivity type projecting from an upper surface <u>of</u> said first layer into said second ~~conductivity type~~ layer.

5. (Original) The solid state image pickup device according to claim 1, wherein the charge storage region of the non-volatile memory element has a floating gate.

6.   (Original) The solid state image pickup device according to claim 1, wherein the charge storage region of the non-volatile memory element has an interface between a silicon nitride film and a silicon oxide film.

7.   (Currently Amended) A solid state image pickup device comprising:

a semiconductor substrate having a first layer of a first conductivity type;

a second layer of a second conductivity type opposite to the first conductivity type, said second layer being formed on the first layer, ~~of~~ in said semiconductor substrate;

a first region of the first conductivity type formed in said second layer and constituting a photodiode with said second layer, the first region being electrically floating;

a first gate structure including a charge storage region and a control gate, said first gate structure being formed on a surface of said semiconductor substrate adjacent to a portion of said first region, and said charge storage region being isolated from said first region;

a second region of the first conductivity type constituting a non-volatile memory element with said first region and said first gate structure, formed in the second layer adjacent to said first gate structure on a side opposite to said first region ;

a first wiring connected to said second region for applying a voltage to said second region;

a light shielding film formed above said first gate structure and having an aperture above ~~an optical window formed on~~ said first region ~~and made of transparent material~~;

a second gate structure of an insulated gate type formed <u>on the surface of said</u>

<u>semiconductor substrate</u>, adjacent to another portion of said first region; and

a third region of the first conductivity type formed <u>in the second layer</u>, adjacent to

said second gate structure on a side opposite to said first region, said third region

constituting an insulated gate type transistor with said first region and said second gate

structure.

8.   (Original) The solid state image pickup device according to claim 7,

further comprising a control circuit for applying a bias voltage to said second gate

structure to turn on the insulated gate type transistor and supplying current to the

non-volatile memory element.

9.   (Original) The solid state image pickup device according to claim 7,

wherein the charge storage region of the non-volatile memory element has a floating

gate.

10.   (Original) The solid state image pickup device according to claim 7,

wherein the charge storage region of the non-volatile memory element has an interface

between a silicon nitride film and a silicon oxide film.

11.   (Currently Amended) A solid state image pickup device comprising:

a semiconductor substrate having a first layer of a first conductivity type;

a second layer of a second conductivity type opposite to the first conductivity

type, said second ~~conductivity type~~ layer being formed on the first layer, ~~of~~ <u>in</u> said

semiconductor substrate;

a first region of the first conductivity type formed in said second ~~conductivity type~~

layer and constituting a photodiode with said second ~~conductivity type~~ layer, <u>the first</u>

region being electrically floating;

a first gate structure including a charge storage region and a control gate, said first gate structure being formed on a surface of said semiconductor substrate adjacent to a portion of said first region, and said charge storage region being electrically isolated from said first region;

a second region of the first conductivity type formed in the second layer, adjacent to said first gate structure on a side opposite to said first region, and constituting a non-volatile memory element with said first region and said first gate structure;

a first wiring connected to said second region for applying a voltage to said second region;

a light shielding film formed above said first gate structure and having an aperture above an optical window formed on said first region and made of transparent material; and

a control circuit for applying a forward bias voltage to the first conductivity type layer of said semiconductor substrate to supply current to the nonvolatile memory element.

12.   (Currently Amended) The solid state image pickup device according to claim 11, further comprising a third projecting region of the first conductivity type projecting from an upper surface of said first layer into said second conductivity type layer.

13.   (Original) The solid state image pickup device according to claim 11, wherein the charge storage region of the non-volatile memory element has a floating gate.

14.   (Original) The solid state image pickup device according to claim 11,

wherein the charge storage region of the non-volatile memory element has an interface

between a silicon nitride film and a silicon oxide film.

15.   (Currently Amended) A driving method for a solid state image pickup

device, comprising the steps of:

(a) applying light to photodiodes distributed in a matrix layout and accumulating

charges representative of image information, said photodiodes being formed in a

second layer having a second conductivity type and being formed on a first layer of a

semiconductor substrate, said first layer having a first conductivity type opposite to said

second conductivity type, each of said photodiodes including a first region of said first

conductivity type formed in said second layer, the first region being electrically floating,

said solid state image pickup device having a gate structure including a control gate and

a charge storage region, and formed on the second layer adjacent said first region, said

charge storage region being electrically isolated from said first region, a drain region of

said first conductivity type formed in the second layer adjacent to the gate structure on a

side opposite to said first region, a first wiring connected to said drain region, a second

wiring connected to said first layer, and a light shielding film formed above said

semiconductor substrate and having apertures optical window made of transparent

material and formed respectively on above the first regions of said photodiodes;

(b) applying a first write control voltage to a said control gate of a non-volatile

memory element having a charge storage region, the control gate and a drain region,

the non-volatile memory element being formed adjacent to each of the photodiodes,

each of said charge storage region being electrically isolated form associated one of

~~said photodiodes, and~~ for tunneling and injecting at least a portion of ~~the~~ charges <u>stored</u>

<u>in said first region</u> representative of the image information into the charge storage

region as signal charges; and

(c) applying ~~a~~ read control ~~voltage~~ <u>voltages</u> to the <u>drain region through said first</u>

<u>wiring and to the control gate</u> ~~non-volatile memory element~~ to detect a threshold voltage

corresponding to an amount of the signal charges injected at said step (b) into the

charge storage region.

16.   (Currently Amended) The driving method for a solid state image pickup

device according to claim 15, further comprising a step of, before said step (c):

(d) applying ~~a~~ second write control ~~voltage~~ <u>voltages</u> to the control gate and <u>to the</u>

drain region <u>through said first wiring</u> ~~of the non-volatile memory element~~ and injecting as

hot carriers at least a portion of the charges <u>stored in the first region</u> representative of

the image information into the charge storage region as signal charges.

17.   (Currently Amended) The driving method for a solid state image pickup

device according to claim 15, wherein said step (c) includes a sub-step of:

(e) applying a bias voltage to an insulated gate type transistor formed adjacent to

another portion of each of the ~~photodiodes~~ <u>first regions</u> to turn on the transistor and

supply a ~~channel~~ current to the ~~non-volatile memory element~~ <u>first region</u>.

18.   (Currently Amended) The driving method for a solid state image pickup

device according to claim 15, wherein said step (c) includes a sub-step of:

(f) applying a forward bias voltage to the first layer ~~of the semiconductor~~

~~substrate~~ <u>through said second wiring</u> to supply a ~~channel~~ current to the ~~non-volatile~~

~~memory element~~ <u>first region</u>.

19.   (Currently Amended) The driving method for a solid state image pickup device according to claim 15, wherein said step (c) includes a sub-step of:

(g) applying a forward bias voltage, through said second wiring, to a ~~first~~ projection region of the first conductivity type formed projecting from an upper surface of the first layer ~~of the semiconductor substrate~~ into the second layer to supply a ~~channel~~ current to the ~~non-volatile memory element~~ first region.

20.   (Currently Amended) The driving method for a solid state image pickup device according to claim 15, further comprising a step of, before said step (a):

(h) applying a reverse bias voltage to the first ~~conductivity type~~ layer ~~of the semiconductor substrate~~ through said second wiring to drain charges accumulated beforehand in the ~~photodiodes~~ first regions to the first layer ~~a semiconductor substrate~~ ~~side~~.

21.   (New) The solid state image pickup device according to claim 1, further comprising a second wiring connected to said first layer for applying a reset voltage from a voltage source to extinguish a potential barrier in the second layer and clear charges accumulated in the first region.

22.   (New) The solid state image pickup device according to claim 1, further comprising a fifth region of the second conductivity type, formed in a surface portion of said first region.

23.   (New) The solid state image pickup device according to claim 7, further comprising a second wiring connected to said first layer for applying a reset voltage from a voltage source to extinguish a potential barrier in the second layer and clear charges accumulated in the first region.

24. (New) The solid state image pickup device according to claim 7, further comprising a fifth-region of the second conductivity type, formed in a surface portion of said first region.

25. (New) The solid state image pickup device according to claim 11, further comprising a second wiring connected to said first layer for applying a reset voltage from a voltage source to extinguish a potential barrier in the second layer and clear charges accumulated in the first region.

26. (New) The solid state image pickup device according to claim 11, further comprising a fifth region of the second conductivity type, formed in a surface portion of said first region.